The Incidence of Pinworm Infection among Indiana Children with Comments on Methods of Laboratory Diagnosis[1]

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Introduction

Enterobiasis, a parasitic disease, is also known by the synonyms pinworm infection, seatworm infection, oxyuriasis, and *Oxyuris* infection. The etiological agent is *Enterobius vermicularis*, a small white nematode, or roundworm, about 1 cm. long, and tapering from the midregion toward each end, the posterior end being considerably elongated and finely pointed. The life history and general disease entity may be obtained from standard texts. We wish to emphasize that the females do not lay eggs while in the intestine, but retain them until the uteri are gravid, at which time the worms migrate from the anus and each female worm deposits some 11,000 eggs on the perianal and perineal skin. This fact was recognized by the Continental workers for some time before it was brought to the attention of workers in the United States by Headlee (4) and by Hall (3). It was emphasized that stool examination was not a reliable method of diagnosis, and that efforts at making a laboratory diagnosis must be directed toward the recovery of the eggs from the perianal region and their identification by miscroscopic examination. In only about 5 per cent of the cases of pinworm infection can ova be found in the feces of the infected individual. A specific diagnosis can be made occasionally by identification of adult worms found in the perineal region or in stool specimens (particularly after a purge), but is most usually made on the basis of eggs found by the miscroscopic examination of materials collected from the perianal skin. In recent years considerable effort has been expended to devise new methods for the recovery of pinworm ova from the perianal region, and to test the devices used in these collection methods for their relative efficacy in performing this function. Among the devices that have received considerable trial may be mentioned the N.I.H. cellophane-tipped anal swab devised by Hall (3), the Graham transparent cellulose (adhesive) tape devise (2), a modification of the same by Jacobs (8), and the glass pestel device of Shüffner and Swellengrebel (11). The literature in regard to the various methods of diagnosis has been recently reviewed by Headlee (7), Beaver (1) and others. It is the purpose of the present paper to report concerning recent experiences with one of these devices, and to comment on its efficacy in the light of experiences with other methods.

Materials and Methods

During the past year some 321 orthopaedic patients confined to the James Whitcomb Riley Hospital for Children were examined to deter-

[1] This work was supported by a grant from Burroughs Wellcome and Company (U.S.A.) Inc.

mine the incidence of pinworm infection among them. This group was chosen because the individuals of the group were usually confined to the hospital for a relatively long period, permitting repeated examinations on several consecutive days, and a more accurate determination of the actual status of pinworm infection. The Jacobs (8) modification of the Graham (2) transparent cellulose (adhesive) tape method was used to collect perianal materials from the patients. By this method a piece of cellulose (adhesive) tape is folded over the end of a tongue depressor, adhesive side out, and is held there by the operator's thumb and forefinger while it is applied to the skin in the region of the anus. Ova or other materials present on the skin will adhere to the tape. After use the tape is then smoothed out on a miscroscope slide, adhesive side down, and examined miscroscopically for ova of the pinworm. To facilitate examination of the tape a drop of toluene was placed between the slide and the tape to clear the preparation and increase visibility, as suggested by Beaver (1).

The cellulose tape devices were made up in advance of the anticipated need. Pieces of paper ¾ in. by 1 in. were stuck to the cellulose tape at the beginning of each 3 inch space as it was unrolled from the dispenser. The tape was then cut crosswise at the middle of each piece of paper, resulting in pieces of tape three inches long, each end having a non-adhesive region ½ inch long by which it could be picked up without adherence to the fingers. The piece of tape was then placed, adhesive side down, on a clean 1 in. by 3 in. glass slide and smoothed out. This tape-device was then placed in a 2¼ in. by 3½ in. Manila coin envelope until used. The tape could be readily removed from the slide to collect perianal materials, then replaced on the slide ready for examination, being replaced in the envelope for transporting to the laboratory. Each tape-device was numbered on one of the paper-tab ends, and the number was used in identification and recording. The number of the tape-device was written on the envelope, along with the name of the patient and other pertinent information.

Results

A total of 2065 examinations were done on the 321 patients studied. Of the 321 individuals examined, 128, or 39.9 per cent, were infected with the pinworm, as determined by the method used. A person was considered negative if no ova of the pinworm were found after the examination of six tape-device preparations, obtained one each on each of six successive mornings. In the present series, 73 of the 321 individuals, or 22.7 per cent, were found to be positive on the first examination. In other words, we detected about 60 per cent of the infected individuals by one examination, using the cellulose (adhesive) tape device. Several individuals were examined at daily intervals for a number of different periods to determine the course of the infection in reference to treatment, and this will be summarized in another report in the near future.

Discussion and Conclusions

Use of the cellulose (adhesive) tape device for the collection of perianal materials, which are then examined microscopically for ova, leads to the detection of a greater percentage of persons harboring the pinworm than does other devices or methods that have been used at the Indiana University Medical Center. By stool examination on a comparable group of children (5), 13, or 7.7 per cent, of 168 children in Riley Hospital were infected with the pinworm. Using the N.I.H. swab, one examination only, 39 or 16.3 per cent, of 240 children in Riley Hospital had pinworm infection (6). In the present series, with one examination, using the cellulose tape-device, 22.7 per cent of the individuals were found to be infected, but when six examinations were made on the same individual, 39.9 per cent of those examined were found to be infected. These data would seem to support the findings of Mazotti and Osorio (10), Beaver (1) and Jeffery (9) that the cellulose (adhesive) tape method of collecting perianal materials in the diagnosis of pinworm infection is substantially superior to the N.I.H. anal swab, and appears to be the most effective device yet tried.

The present findings indicate that pinworm infection is much more prevalent among Indiana children than was formerly supposed.

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